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**Deng**

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(54) **PRODUCTION METHOD OF BACKLIGHT PLATE, BACKLIGHT PLATE, AND BACKLIGHT MODULE**

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(58) **Field of Classification Search**  
CPC ..... G02B 6/0055; G02B 6/0065; G02F 1/133605  
See application file for complete search history.

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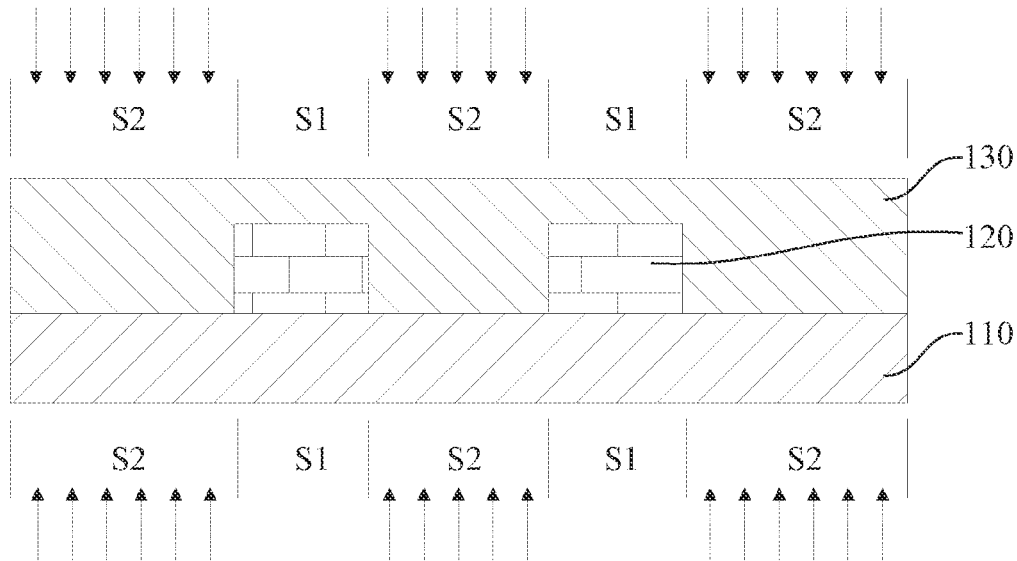
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(57) **ABSTRACT**

A production method of a backlight plate, a backlight plate and a backlight module are provided. The method includes providing a light-transmitting substrate which comprises a first area and a second area, forming a pad on the light-transmitting underlay substrate corresponding to the first area, coating a layer of photosensitive material on the light-transmitting substrate and the pad to form a reflective layer, exposing a position of the second area at opposite sides of the light-transmitting substrate that the reflective layer corresponds to, and developing the reflective layer to form a groove for exposing the pad on the first area that the reflective layer corresponds to. The present disclosure ensures the stability of the reflective layer and enhances the overall reflectance of the backlight plate.

**19 Claims, 4 Drawing Sheets**



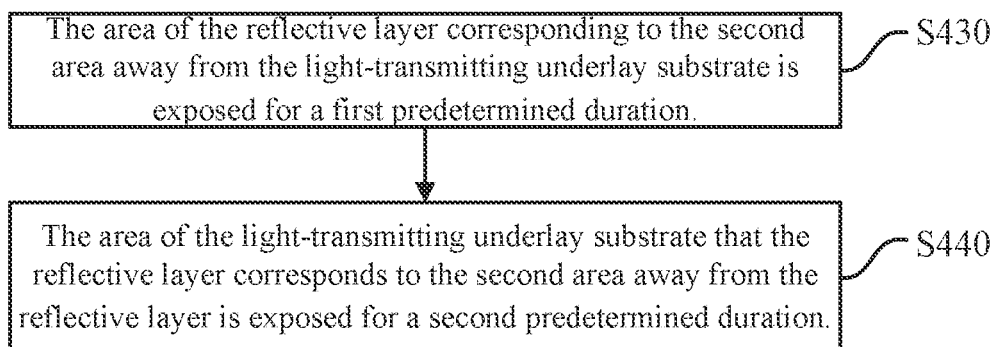
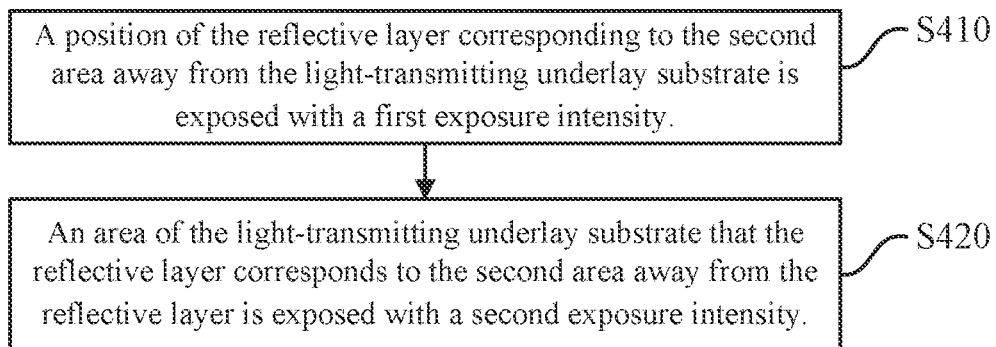
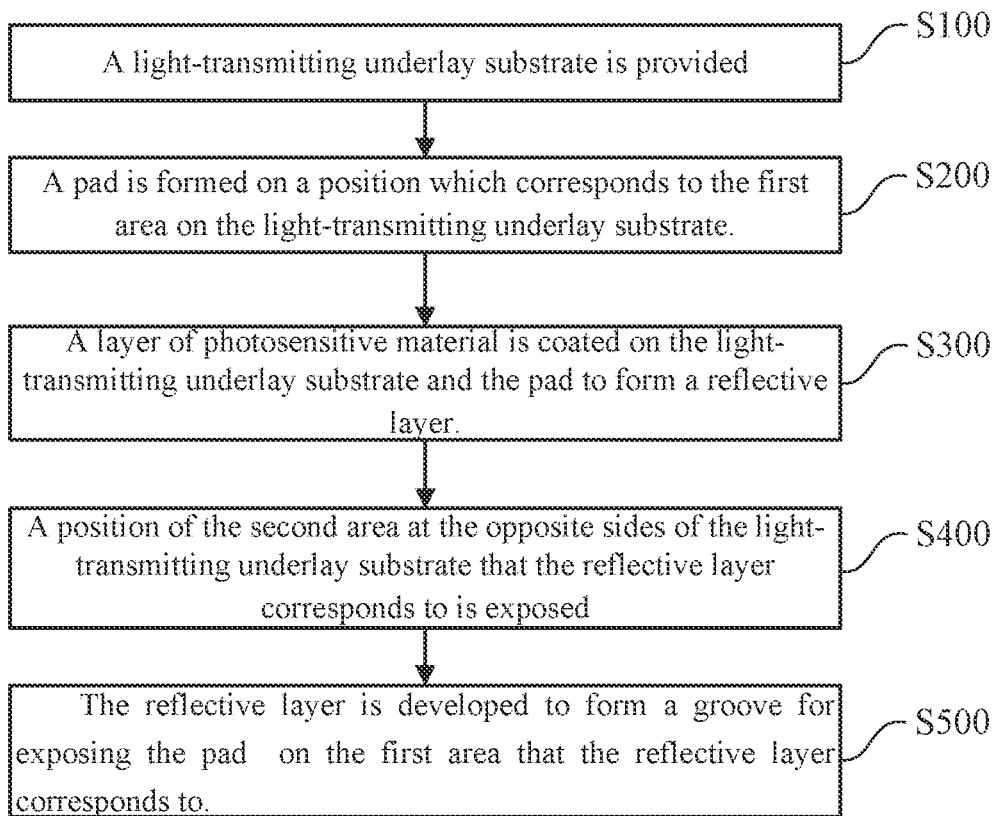
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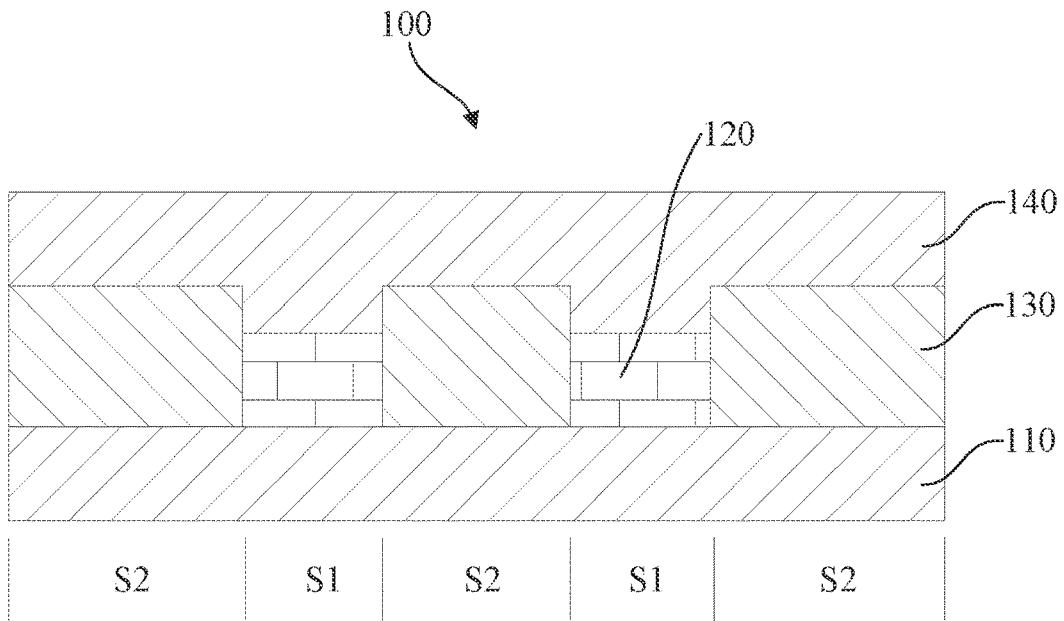


FIG. 4

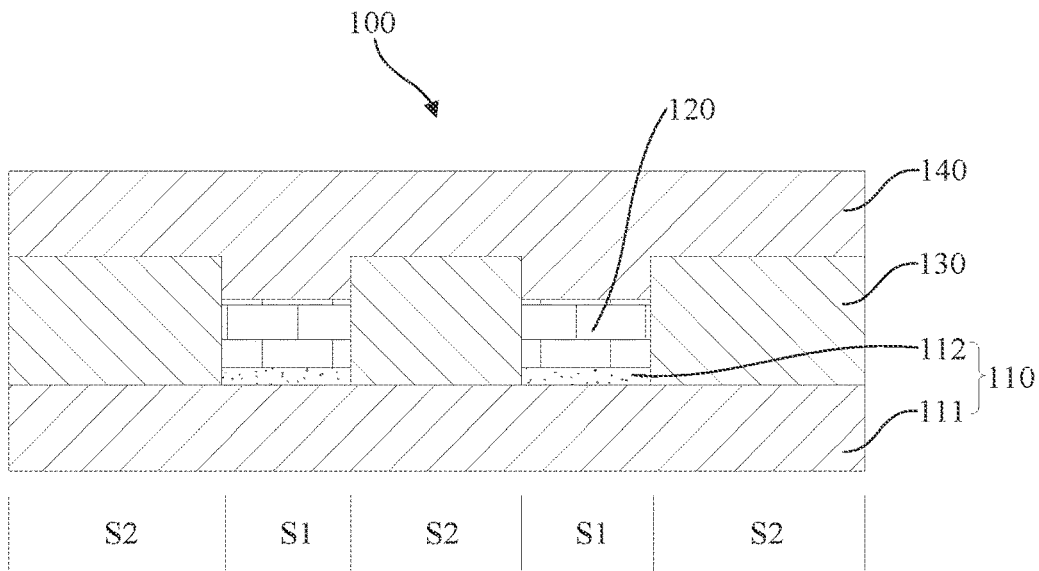


FIG. 5

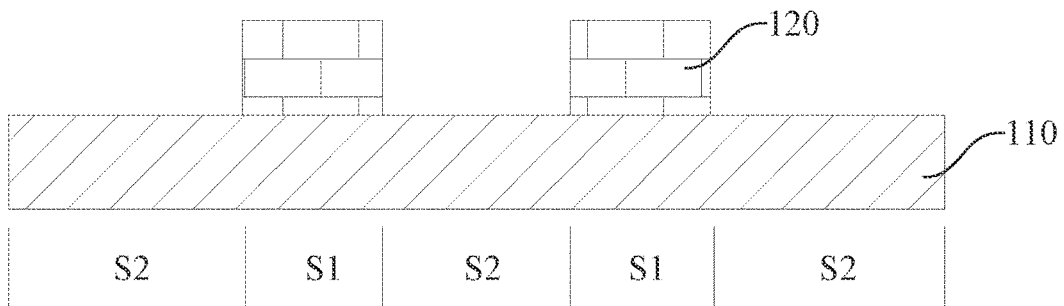


FIG. 6

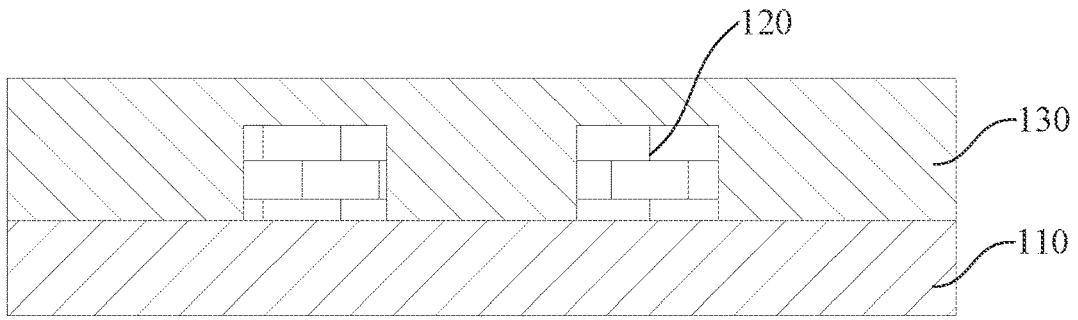


FIG. 7

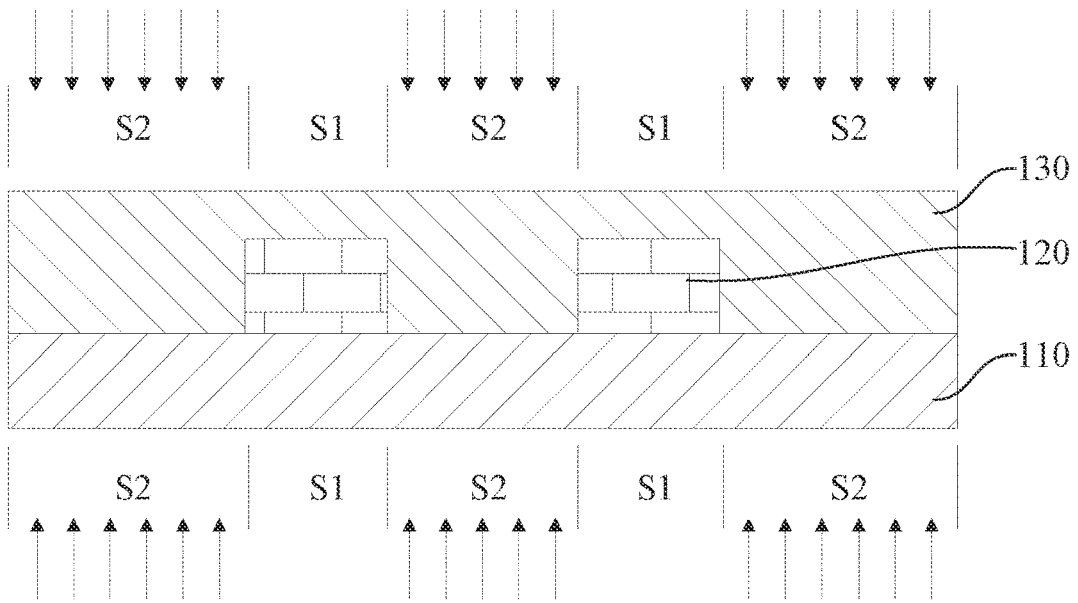


FIG. 8

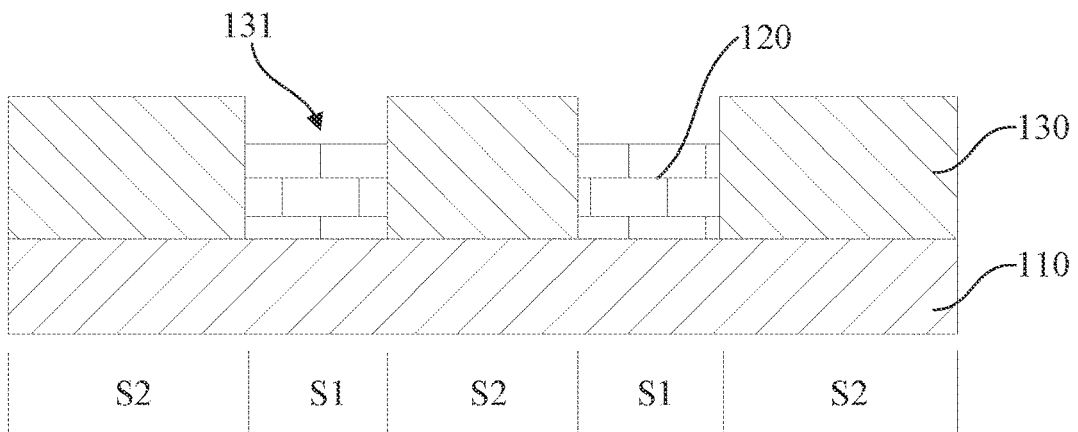


FIG. 9

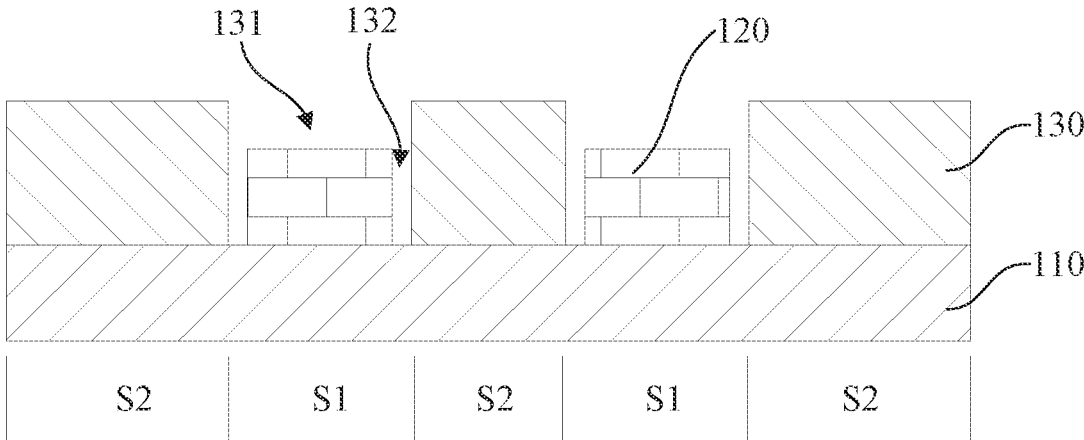


FIG. 10

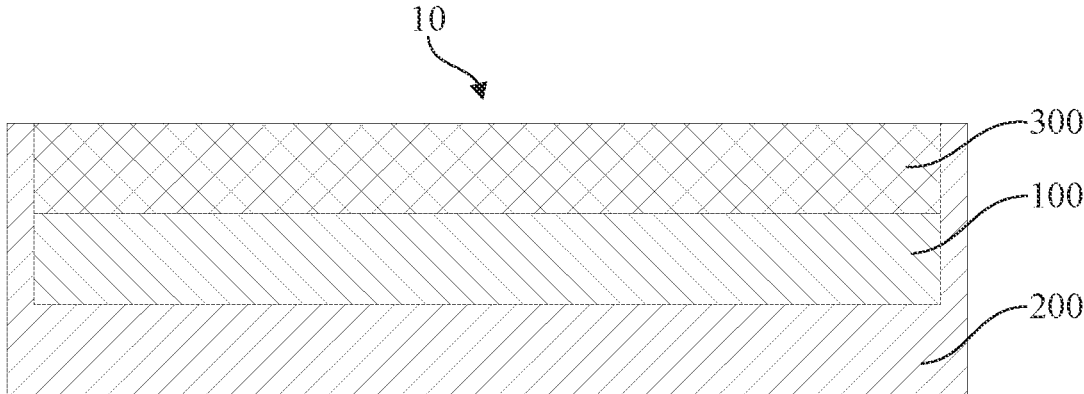


FIG. 11

**PRODUCTION METHOD OF BACKLIGHT  
PLATE, BACKLIGHT PLATE, AND  
BACKLIGHT MODULE**

CROSS REFERENCE OF RELATED  
APPLICATION

This application is a US national phase application based upon an International Application No. PCT/CN2021/137052, filed on Dec. 10, 2021, which claims the priority of Chinese Patent Application No. 202111429012.2, entitled "Production Method of Backlight Plate, Backlight Plate, and Backlight Module", filed on Nov. 29, 2021, the disclosures of which are incorporated herein by reference in its entirety.

BACKGROUND

1. Field of the Disclosure

The present disclosure relates to the field of display technology, and more particularly, to a production method of a backlight plate, a backlight plate, and a backlight module.

2. Description of the Related Art

With the development of display technology, a reflective layer is used on the surface of a backing plate of a backlight plate to increase display brightness and a method of exposure development is adopted to form a window to expose a pad on the backing plate in mini light-emitting diode (Mini-LED) display technology. However, the reflective layer is prone to undercut, resulting in lower reflectance of the backlight plate in the related art.

SUMMARY

The preferred embodiment of the present disclosure proposes a production method of a backlight plate, a backlight plate, and a backlight module to solve the problem that the reflectance of a backlight plate of the related art is comparatively low due to frequent undercut of a reflective layer of the related art easily.

According to an embodiment of the present disclosure, a production method of a backlight plate includes: proposing a light-transmitting substrate which comprises a first area and a second area; forming a pad on the light-transmitting underlay substrate corresponding to the first area; coating a layer of photosensitive material on the light-transmitting substrate and the pad to form a reflective layer; exposing a position of the second area at opposite sides of the light-transmitting substrate that the reflective layer corresponds to; and developing the reflective layer to form a groove for exposing the pad on the first area that the reflective layer corresponds to.

Optionally, the exposing the position of the second area at the opposite sides of the light-transmitting substrate that the reflective layer corresponds to comprises: exposing, with a first exposure intensity, a position of the reflective layer corresponding to the second area away from the light-transmitting substrate; exposing, with a second exposure intensity greater than the first exposure intensity, an area of the light-transmitting substrate that the reflective layer corresponds to the second area away from the reflective layer.

Optionally, the first exposure intensity is greater than or equal to 300 milli Joule (mJ); the first exposure intensity is less than or equal to 800 mJ; and/or the second exposure

intensity is greater than or equal to 300 mJ; the second exposure intensity is less than or equal to 800 mJ.

Optionally, the exposing the position of the second area at the opposite sides of the light-transmitting substrate that the reflective layer corresponds to comprises: exposing a position of the reflective layer corresponding to the second area away from the light-transmitting underlay substrate for a first predetermined duration; exposing an area of the light-transmitting underlay substrate that the reflective layer corresponds to the second area away from the reflective layer **130** for a second predetermined duration; the second predetermined duration being greater than the first predetermined duration.

Optionally, the exposing a position of the second area at opposite sides of the light-transmitting substrate that the reflective layer corresponds to comprises: exposing a position on the second area that the reflective layer corresponds to while the area on the second area that one side of the reflective layer away from the light-transmitting underlay substrate corresponds to and the area on the second area that the reflective layer away from one side of the light-transmitting underlay substrate corresponds to are exposed.

Optionally, the light transmission of the first area of the light-transmitting underlay substrate is less than that of the second area of the light-transmitting underlay substrate.

Optionally, the proposing the light-transmitting underlay substrate comprises: providing a light-transmitting substrate; disposing a light-shielding layer on a side of a light-shielding area of the light-transmitting substrate to form a light-transmitting underlay substrate; the light-shielding area being defined as a first area; or disposing the light-shielding layer at opposite sides of the light-shielding area of the light-transmitting substrate to form a light-transmitting underlay substrate; the light-shielding area being defined as the first area.

Optionally, the forming the pad on the light-transmitting underlay substrate corresponding to the first area comprises: forming a metal layer on the light-transmitting substrate; etching a position of the second area that the metal layer corresponds to form the pad on a position of the first area that the light-transmitting underlay substrate corresponds to.

Optionally, the thickness of the reflective layer is less than or equal to 70 micrometers ( $\mu\text{m}$ ).

Optionally, a gap is arranged between a side wall of the groove on the reflective layer and the pad of the backlight plate; the gap is less than or equal to 30  $\mu\text{m}$ .

Optionally, the pad and an area that the gap corresponds to is the first area.

Optionally, the method further comprises: connecting a light plate to the pad.

According to another embodiment of the present disclosure, a backlight plate comprises: a light-transmitting underlay substrate, comprising a first area and a second area; a pad, disposed on a position of the first area that the light-transmitting underlay substrate corresponds to; a reflective plate, disposed on the light-transmitting underlay substrate; a groove being disposed on a position of the pad that the reflective layer corresponds to; the groove exposing the pad.

Optionally, the backlight plate comprises the plurality of pads; the plurality of pads are disposed at intervals; the groove exposes the plurality of pads.

Optionally, the backlight plate comprises the plurality of pads; the plurality of grooves are disposed on the reflective layer; the plurality of grooves correspond to the plurality of pads one on one.

Optionally, a side wall of the groove is vertical to the light-transmitting underlay substrate.

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Optionally, the light-transmitting underlay substrate comprises a light-transmitting substrate and a light-shielding layer; the light-transmitting substrate comprises a light-shielding area; the light-shielding layer is disposed on a side of the light-shielding layer; the light-shielding layer is defined as the first area.

Optionally, the light-shielding layer is disposed at opposite sides of the light-shielding area.

Optionally, the backlight plate comprises a light plate; the light plate is connected to the pad.

According to another embodiment of the present disclosure, a backlight module, comprises the above backlight plate.

According to the embodiment of the present disclosure, a light-transmitting underlay substrate is a carrier substrate with function of light transmission is provided. A reflective layer at opposite sides of the light-transmitting underlay substrate is exposed to increase photo sensibility of each photosensitive molecule in a photosensitive material of the reflective layer, to enhance the bonding among each of the photosensitive molecules, and to avoid undercut because of smaller photo sensibility of each of the photosensitive molecules of the thicker reflective layer, thereby ensuring the stability of the reflective layer and enhancing the overall reflectance of the backlight plate.

BRIEF DESCRIPTION OF THE DRAWINGS

To describe the technical solutions in the embodiments of this application more clearly, the following briefly introduces the accompanying drawings required for describing the embodiments. Apparently, the accompanying drawings in the following description show merely some embodiments of this application, and a person of ordinary skill in the art may still derive other drawings from these accompanying drawings without creative efforts.

FIG. 1 is a flowchart of a method of producing a backlight plate according to an embodiment of the present disclosure.

FIG. 2 is a flowchart of the block S400 illustrated in FIG. 1.

FIG. 3 is another flowchart of the block S400 illustrated in FIG. 1.

FIG. 4 illustrates a schematic diagram of a backlight plate according to an embodiment of the present disclosure.

FIG. 5 illustrates a schematic diagram of a backlight plate according to another embodiment of the present disclosure.

FIG. 6 illustrates a schematic diagram of a backlight plate corresponding to the block S200 illustrated in FIG. 1.

FIG. 7 illustrates a schematic diagram of a backlight plate corresponding to the block S300 illustrated in FIG. 1.

FIG. 8 illustrates a schematic diagram of a backlight plate corresponding to the block S400 illustrated in FIG. 1.

FIG. 9 illustrates a schematic diagram of a backlight plate corresponding to the block S500 illustrated in FIG. 1.

FIG. 10 illustrates another schematic diagram of a backlight plate corresponding to the block S500 illustrated in FIG. 1.

FIG. 11 illustrates a schematic diagram of a backlight plate according to still another embodiment of the present disclosure.

| Reference character | Element          |
|---------------------|------------------|
| 10                  | Backlight module |
| 100                 | Backlight plate  |

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-continued

| Reference character | Element                               |
|---------------------|---------------------------------------|
| 110                 | Light-transmitting underlay substrate |
| 111                 | Light-transmitting substrate          |
| 112                 | Light-shielding layer                 |
| 120                 | Pad                                   |
| 130                 | Reflective layer                      |
| 131                 | Groove                                |
| 132                 | Gap                                   |
| 140                 | Light plate                           |
| 200                 | Backlight plate                       |
| 300                 | Optical film group                    |
| S1                  | First area                            |
| S2                  | Second area                           |

DETAILED DESCRIPTION OF THE EMBODIMENTS

To help a person skilled in the art better understand the solutions of the present disclosure, the following clearly and completely describes the technical solutions in the embodiments of the present invention with reference to the accompanying drawings in the embodiments of the present invention. Apparently, the described embodiments are a part rather than all of the embodiments of the present invention. All other embodiments obtained by a person of ordinary skill in the art based on the embodiments of the present invention without creative efforts shall fall within the protection scope of the present disclosure.

All of the terminologies containing one or more technical or scientific terminologies have the same meanings that persons skilled in the art understand ordinarily unless they are not defined otherwise. For example, “upper” or “lower” of a first characteristic and a second characteristic may include a direct touch between the first and second characteristics. The first and second characteristics are not directly touched; instead, the first and second characteristics are touched via other characteristics between the first and second characteristics.

A preferred embodiment of the present disclosure proposes a production method of a backlight plate 100. The production method includes blocks as follows: block S100 and block S200, block S300, block S400, and block S500, as shown in FIG. 1 to FIG. 4.

At block S100, a light-transmitting underlay substrate 110 is provided. The light-transmitting underlay substrate 110 includes a first area S1 and a second area S2.

The light-transmitting underlay substrate 110 is a carrier substrate with function of light transmission in the embodiment of the present disclosure. On one hand, the light-transmitting underlay substrate 110 is configured to support other structures on the backlight plate 100. On the other hand, the light-transmitting underlay substrate 110 is configured to facilitate the design for the direction of light of the mask process for the backlight plate 100. The production process for the backlight plate 100 is adjusted and designed according to practical demands.

A material for the light-transmitting underlay substrate 110 may be a glass substrate or other composite materials. The material for the substrate in the present disclosure is not confined to specific types as long as the substrate is highly transparent.

Preferably, the light-transmitting underlay substrate 110 includes a first area S1 and a second area S2. The first area S1 and the second area S2 are divided according to the type

of the film layer disposed on the light-transmitting underlay substrate **110**, the transparency of the light-transmitting underlay substrate **110**, or the function of the different areas on the light-transmitting underlay substrate **110**. The specific division of the areas on the light-transmitting underlay substrate **110** is adjusted according to practical situations.

The structure of the first area **S1** and the second area **S2**, such as shape, size, and mutual positional relationship, etc., are correspondingly adjusted and designed according to the production process for the backlight plate **100** and the specific structure of the backlight plate **100**. In other words, the structure of the first area **S1** and the second area **S2** in the present disclosure is not confined to specific types.

At block **S200**, a pad **120** is formed on a position which corresponds to the first area **S1** on the light-transmitting underlay substrate **110**. It is necessary to form the pad **120** on the light-transmitting underlay substrate **110** after the light-transmitting underlay substrate **110** is divided into different areas so that other structures can be connected to the light-transmitting underlay substrate **110**.

The arrangement of the pad **120** in the first area **S1** is good to localize the pad **120** so as to precisely connect other structures to the pad **120** afterwards. Besides, the design of the pad **120** is also the basis for the division of the first area **S1** on the light-transmitting underlay substrate **110** to facilitate the design of the light-transmitting underlay substrate **110**. That is, the specific structure of the pad **120** has a mutually defined relationship between the specific structure of the first area **S1** in the light-transmitting underlay substrate **110**.

Please refer to FIG. 6. The way of forming the pad **120** on the light-transmitting underlay substrate **110** is that, a metal layer is formed on the light-transmitting underlay substrate **110** followed by the metal layer etched based on the defined patterns of the first area **S1** and the second area **S2** so as to remove the metal layer in the second area **S2** by etching while the metal layer in the first area **S1** is saved. At the end, the pad **120** is formed.

At block **S300**, a layer of photosensitive material is coated on the light-transmitting underlay substrate **110** and the pad **120** to form a reflective layer **130**. The second area **S2** on the light-transmitting underlay substrate **110** is in the exposed state after the first area **S1** on the light-transmitting underlay substrate **110** forms the pad **120**. When the light irradiates onto the light-transmitting underlay substrate **110**, some of the light penetrates the light-transmitting underlay substrate **110**. Because the light-transmitting underlay substrate **110** is light transmissive, the reflectance of the backlight plate **100** is comparatively low.

As FIG. 7 illustrates, a layer of photosensitive material is coated on the light-transmitting underlay substrate **110** and the pad **120** to form a reflective layer **130** so that the light irradiating onto the light-transmitting underlay substrate **110** can be reflected, thereby increasing the overall reflectance of the backlight plate **100**.

The reflective layer **130** is made of a photosensitive material so the properties of the reflective layer **130** are directly related to the mask conditions. The photosensitive material for the reflective layer **130** facilitates the regulation of the structure of the reflective layer **130** through the regulation of the mask process in the production of the backlight plate **100**. Accordingly, a requirement for the structure of the reflective layer **130** is satisfied and further, the reflection effect that the backlight plate **100** has is improved.

At block **S400**, a position of the second area **S2** at the opposite sides of the light-transmitting underlay substrate

**110** that the reflective layer **130** corresponds to is exposed. The opposite sides of the light-transmitting underlay substrate **110** refers to one side of the reflective layer **130** away from the light-transmitting underlay substrate **110** and one side of the light-transmitting underlay substrate **110** away from the reflective layer **130**.

The photosensitive material for the reflective layer **130** features certain fluidity after the reflective layer **130** is coated, and the bonding between the photosensitive molecules in the photosensitive material is relatively weak, so it is not good for the reflective layer **130** to reflect light. The reflective layer **130** is exposed such that the bonding between the photosensitive molecules in the photosensitive material is gradually enhanced under irradiation of the light to solidify the reflective layer **130** and ensure that the reflectance of the reflective layer **130** is high.

Please refer to FIG. 8. The reflective layer **130** on the opposite sides of the light-transmitting underlay substrate **110** is exposed in the present embodiment because the light-transmitting underlay substrate **110** is characteristic of light transmission to increase photo sensibility in each of the photosensitive molecules in the photosensitive material and then to prevent relatively weak bonding of the photosensitive molecules due to low photo sensibility of the photosensitive molecules in the thicker area of the reflective layer **130**, which may negatively affect the stability of the reflective layer **130** and the overall reflectance of the reflective layer **130**.

The reflective layer **130** at the opposite sides of the light-transmitting underlay substrate **110** is exposed in the present disclosure. However, the exposure intensity and exposure time used in the exposure process can be adjusted according to the specific structure of the reflective layer **130**, which is not particularly limited here.

At block **S500**, the reflective layer **130** is developed to form a groove **131** for exposing the pad **120** on the first area **S1** that the reflective layer **130** corresponds to.

After being formed on the light-transmitting underlay substrate **110** and the pad **120**, the reflective layer **130** on the pad **120** needs to be removed to expose the pad **120** so as to facilitate the connection between other structures and the pad **120**. In this way, the backlight plate **100** can operate normally.

Since the area where the reflective layer **130** corresponds to the second area **S2** is mainly exposed in the exposure process, the photo sensibility of the reflective layer **130** corresponding to the second area **S2** is greater than the photo sensibility of the reflective layer **130** corresponding to the first area **S1**. In other words, the bonding of the photosensitive molecules of the reflective layer **130** corresponding to the second area **S2** is greater than the bonding of the photosensitive molecules of the reflective layer **130** corresponding to the first area **S1**. Thereby, the stability of the reflective layer **130** corresponding to the first area **S1** and the stability of the reflective layer **130** corresponding to the second area **S2** differ a lot in the same treatment conditions.

Please refer to FIG. 9. The reflective layer **130** is developed in the embodiment of the present disclosure. The bonding of the photosensitive molecules of the reflective layer **130** corresponding to the first area **S1** is worse so the stability of the reflective layer **130** corresponding to the first area **S1** is relatively worse. A developer is sprayed on the reflective layer **130**, and the reflective layer **130** corresponding to the first area **S1** is dissolved in the developer while the reflective layer **130** corresponding to the second area **S2** keeps relatively stable; thereby, a groove **131** is formed in the position of the reflective layer **130** corresponding to the

first area S1. The pad 120 is formed in the first area S1 on the light-transmitting underlay substrate 110 so the groove 131 can be exposed to expose the pad 120 by the developing process, thereby facilitating the connection between other structures and the pad 120.

The light-transmitting underlay substrate 110 featuring light transmission is taken as a carrier substrate in the production method for the backlight plate 100 in the embodiment of the present disclosure. The reflective layer 130 at both opposite sides of the light-transmitting underlay substrate 110 is exposed to increase photo sensibility of the photosensitive molecules in the photosensitive material of the reflective layer 130 and the bonding of each of the photosensitive molecules and prevent undercut due to lower photo sensibility of some of the photosensitive molecules of the reflective layer 130 with greater thickness, thereby ensuring the stability of the reflective layer 130 and increasing the overall reflectance of the backlight plate 100.

As illustrated in FIG. 2, the block S400 of exposing the position on the second area S2 that the reflective layer 130 corresponds to further includes block S410 and block S420.

At block S410, away from the light-transmitting underlay substrate 110, a position of the reflective layer 130 corresponding to the second area S2 is exposed with a first exposure intensity.

At block S420, away from the reflective layer 130, an area of the light-transmitting underlay substrate 110 that the reflective layer 130 corresponds to the second area S2 is exposed with a second exposure intensity. The second exposure intensity is greater than the first exposure intensity.

Away from the reflective layer 130, an area of the light-transmitting underlay substrate 110 that the reflective layer 130 corresponds to the second area S2 is exposed. When the light irradiates onto the area that the reflective layer 130 corresponds to, the reflective layer 130 not only contains sufficient photo sensibility in a certain range of the thickness but also keeps itself from being damaged by adjusting the first exposure intensity.

The light needs to penetrate the light-transmitting underlay substrate 110 before the area of the light-transmitting underlay substrate 110 that the reflective layer 130 corresponds to the second area S2 is exposed away from the reflective layer 130. Although the light-transmitting underlay substrate 110 is characteristic of light transmission, some energy still loses when the light penetrates the light-transmitting underlay substrate 110. The photo sensibility of one side of the reflective layer 130 near the light-transmitting underlay substrate 110 is less than photo sensibility of one side of the reflective layer 130 away from the light-transmitting underlay substrate 110 with the same exposure intensity. Therefore, there is a difference in performance for different areas of the reflective layer 130.

The reflective layer 130 is exposed under the condition that the second exposure intensity is greater than the first exposure intensity to make up the energy loss when the light penetrates the light-transmitting underlay substrate 110 and to balance the exposure effect on both sides of the reflective layer 130, thereby improving the structural unity of the reflective layer 130 In the present embodiment.

Preferably, to ensure that each photosensitive molecule of the photosensitive material of the reflective layer 130 near the light-transmitting underlay substrate 110 has sufficient photo sensibility, the first exposure intensity is controlled to be greater than or equal to 300 milli Joule (mJ) to meet the demand of photosensitive molecules in photosensitive materials for photo sensibility. If the first exposure intensity is too large, the organic ingredients in the photosensitive material

may be decomposed or damaged due to excessive light energy. As a result, the reflective layer 130 is structurally destroyed, and the reflection effect of the reflective layer 130 is affected. Due to these reasons, the first exposure intensity is controlled to be less than or equal to 800 mJ.

In the practical production process, the first exposure intensity may be 300 mJ, 400 mJ, 500 mJ, 600 mJ or 800 mJ, etc. The first exposure intensity can be correspondingly adjusted and designed according to the practical situations, which is not confined here as long as photo sensibility of the photosensitive material on the position which the reflective layer 130 corresponds to is sufficient to prevent the reflective layer 130 from being damaged due too much exposure intensity.

To ensure that each photosensitive molecule of the photosensitive material of the reflective layer 130 near the light-transmitting underlay substrate 110 has sufficient photo sensibility, the second exposure intensity is controlled to be greater than or equal to 300 mJ to meet the demand of photosensitive molecules in photosensitive materials for photo sensibility. To prevent the reflective layer 130 from being damaged by too much exposure intensity, the second exposure intensity is controlled to be less than or equal to 800 mJ.

In the practical production process, the second exposure intensity may be 300 mJ, 400 mJ, 500 mJ, 600 mJ or 800 mJ, etc. The second exposure intensity can be correspondingly adjusted and designed according to the practical situations, which is not confined here as long as photo sensibility of the photosensitive material on the position which the reflective layer 130 corresponds to is sufficient to prevent the reflective layer 130 from being damaged due too much exposure intensity.

The second exposure intensity needs to be designed to be greater than the first exposure intensity to ensure similar exposure effects on both sides of the reflective layer 130. Practically, the first exposure intensity is set as 300 mJ and the second exposure intensity is set as 450 mJ, the first exposure intensity is set as 450 mJ and the second exposure intensity is set as 550 mJ, or the first exposure intensity is set as 600 mJ and the second exposure intensity is set as 650 mJ. The specific size and the difference between the first exposure intensity and the second exposure intensity can be adjusted according to the production requirements, light transmission of the light-transmitting underlay substrate 110, and energy loss of light in the light-transmitting underlay substrate 110, which is not limited here.

Please refer to FIG. 3. The block S400 of exposing the area on the second area S2 that the reflective layer 130 corresponds to further includes block S430 and block S440.

At block S430, away from the light-transmitting underlay substrate 110, the area of the reflective layer 130 corresponding to the second area S2 is exposed for a first predetermined duration.

At block S440, away from the reflective layer 130, the area of the light-transmitting underlay substrate 110 that the reflective layer 130 corresponds to the second area S2 is exposed for a second predetermined duration. The second predetermined duration is greater than the first predetermined duration.

Some energy definitely loses when the exposed light penetrates the light-transmitting underlay substrate 110. To shorten the difference of the exposure effect on the opposite sides of the reflective layer 130, the amount of the first exposure intensity and the second exposure intensity is adjusted. In addition, the exposure time for the opposite

sides of the reflective layer **130** is correspondingly adjusted to improve the homogeneity of the structure of the reflective layer **130**.

Preferably, the second predetermined duration is greater than the first predetermined duration in the present embodiment to increase the duration for exposure the side of the light-transmitting underlay substrate **110** away from the reflective layer **130** and photo sensibility of the side of the reflective layer **130** near the light-transmitting underlay substrate **110** so as to maintain the amount of photo sensibility on both sides of the reflective layer **130** in the same exposure intensity, thereby improving the homogeneity of the structure of the reflective layer **130**.

The first predetermined duration, the second predetermined duration, and the difference between the first predetermined duration, and the second predetermined duration can be adjusted correspondingly according to practical need, light transmission of the light-transmitting underlay substrate **110**, and energy loss while the light penetrates the light-transmitting underlay substrate **110**, which is not particularly limited here.

Preferably, before the area on the second area **S2** that the reflective layer **130** corresponds to is exposed, the area on the second area **S2** that one side of the reflective layer **130** away from the light-transmitting underlay substrate **110** corresponds to is exposed, or the area on the second area **S2** that the reflective layer **130** away from one side of the light-transmitting underlay substrate **110** corresponds to is exposed. Or, the area on the second area **S2** that the reflective layer **130** corresponds to is exposed while the area on the second area **S2** that one side of the reflective layer **130** away from the light-transmitting underlay substrate **110** corresponds to and the area on the second area **S2** that the reflective layer **130** away from one side of the light-transmitting underlay substrate **110** corresponds to are exposed.

When the area on the second area **S2** that the reflective layer **130** corresponds to is exposed, photo sensibility of the photosensitive material of the reflective layer **130** near the exposed side is greater and the bonding of the corresponding photosensitive material is stronger. If the thickness of the reflective layer **130** is larger, photo sensibility of the photosensitive material of the reflective layer **130** away from the exposed side is relatively less, the bonding of the corresponding photosensitive material is weaker, and even effective bonding and solidarity fail.

At this time, the area on the second area **S2** that another side of the reflective layer **130** corresponds to is exposed, the photosensitive material with weaker bonding or ineffective bonding maintains bonding and solidarity because of an increase in photo sensibility while the bonding strength between the photosensitive material with weaker bonding or ineffective bonding and the bonded and solidified photosensitive material becomes weaker; thereby, the boundary line may occur in the reflective layer **130**, affecting the stability of the reflective layer **130** overall.

Practically, the area on the second area **S2** that one side of the reflective layer **130** away from the light-transmitting underlay substrate **110** corresponds to and the area on the second area **S2** that the reflective layer **130** away from one side of the light-transmitting underlay substrate **110** corresponds to are exposed so that the photosensitive material of the reflective layer **130** can be simultaneously bonded and solidified and the bonding strength of the photosensitive material of the reflective layer **130** can be increased, the stability of the entire reflective layer **130** can be ensured, and thereby, the reflection effect of the reflective layer **130** is enhanced.

A mask is produced followed by the exposure process so that the amount of photo sensibility in an upper area of the reflective layer **130** can be greater and the amount of photo sensibility in some areas of the reflective layer **130** can be less. Thereby, there is a difference in the binding of the photosensitive material of the corresponding areas to facilitate the processes such as subsequent development etching.

Preferably, the method of producing a backlight plate **100** includes connecting a light plate **140** to a pad **120**. A backlight plate **100** is mainly configured to provide a backlight source to a display device to implement the display device with diverse display screens. It is notified that the light-emitting light source of the backlight plate **100** is primarily the light plate **140** and that the light plate **140** is connected to the pad **120** to fix the light plate **140**.

The light plate **140** includes a plurality of lamp strings. The light-emitting conditions of the light plate **140** are adjusted by mutual cooperation and mutual design through color and arrangement of light strings to meet the requirements of the display device for different light sources and to realize the diversity of the display screens of the display device.

The definition of the position of the pad **120** by the division of the first area **S1** on the light-transmitting underlay substrate **110** realizes the definition of the arrangement of the light plate **140**. Similarly, the setting position of the pad **120** can be adjusted according to the arrangement of the light plate **140** in the production process of the backlight plate **100**. Thereby, the division mode of the first area **S1** on the light-transmitting underlay substrate **110** is designed to achieve the requirements of light transmission of the backlight plate **100** overall.

In the embodiment of the present disclosure, the light transmission of the first area **S1** of the light-transmitting underlay substrate **110** is less than that of the second area **S2** of the light-transmitting underlay substrate **110**. In other words, light transmission of the light-transmitting underlay substrate **110** at the position corresponding to the pad **120** is less than that at the position corresponding to the reflective layer **130**. When the reflective layer **130** is developed, it is necessary to remove the portion of the reflective layer **130** corresponding to the first area **S1**. That is, the portion of the reflective layer **130** covering the surface of the pad **120** needs to be removed to facilitate the connection between the pad **120** and the light plate **140**. The light transmission rate of the first area **S1** of the light-transmitting underlay substrate **110** is set to be less than the light transmission rate of the second area **S2** so that the light-transmitting underlay substrate **110** can be configured as a mask to expose the reflective layer **130** directly on the side of the light-transmitting underlay substrate **110** away from the reflective layer **130**. Thereby, the production process is simplified and the production efficiency is improved as well.

Preferably, the light-transmitting underlay substrate **110** is made of a composite structural material with light transmission. That is, the material with different light transmission rates for the light-transmitting underlay substrate **110** is utilized. Besides, the material with different light transmission rates is composite according to the requirements of division of the first area **S1** and the second area **S2** so that the light transmission rate of the first area **S1** is smaller than the light transmission rate of the second area **S2**.

At Block **S100**, the light-transmitting underlay substrate **110** includes some details as follows.

Please refer to FIG. **5**. Firstly, a light-transmitting substrate **111** is proposed. The light transmission of the light-transmitting substrate **111** is the same everywhere, such as a

glass substrate. the light-transmitting substrate **111** is configured to carry other structures in the backlight plate **100**. Secondly, a light-shielding layer **112** is arranged on one side of a light-shielding area of the light-transmitting substrate **111** to form a light-transmitting underlay substrate **110**. Especially, the light-shielding area is defined as a first area **S1** and configured to shield the light in the relative area when one side of the light-transmitting underlay substrate **110** away from the reflective layer **130** is exposed to reduce the transmission rate of the exposed light.

It is notified that, the light-shielding layer **112** proposed by the present embodiment is a film layer having a smaller light transmission or a completely opaque film layer with the light transmission of zero (0). It is only necessary to ensure that the setting of the light-shielding layer **112** can effectively reduce the light transmission rate of the exposure light in the corresponding area. There is no restriction here.

Especially, the light-shielding layer **112** can be arranged on one side of the light-transmitting substrate **111** near the reflective layer **130** or on one side of the light-transmitting substrate **111** away from the reflective layer **130**. In other words, the light-shielding layer **112** is arranged on more than one side of the light-transmitting substrate **111**, and the light-shielding layer **112** corresponds to the pad **120** to ensure that photo sensibility of the reflective layer **130** above the pad **120** is reduced without affecting photo sensibility of the other parts of the reflective layer **130**.

Practically, the position of the pad **120** is determined based on the setting mode of the light-shielding layer **112** or the arrangement requirements of the light plate **140**. Afterwards, the division mode of the first area **S1** is confined to determine the position of the light-shielding layer **112**. The specific setting mode can be adjusted according to the actual demand.

In a preferred embodiment of the present disclosure, a light-shielding layer **112** is arranged on two opposite sides of a light-shielding area of a light-transmitting substrate **111** to form a light-transmitting underlay substrate **110**. Especially, the light-shielding area is defined as a first area **S1** to ensure photo sensibility of a reflective layer **130** located in a second area **S2** and further reduce photo sensibility of the reflective layer **130** located in the first area **S1** so that the reflective layer **130** on the pad **120** can be easily dissolved in a developer in the developing process and that the connection between the light plate **140** and the pad **120** can be not affected by the reflective layer **130** which is remained on the pad **120**, thereby affecting the luminous effect of a backlight plate **100**.

Preferably, the thickness of the reflective layer **130** of the backlight plate **100** is less than or equal to 70 micrometers ( $\mu\text{m}$ ). If the thickness of the reflective layer **130** is too large, photo sensibility in the middle part of the reflective layer **130** can be relatively small. The bonding of the corresponding photosensitive material is also relatively low. When the reflective layer **130** is developed, the reflective layer **130** may be developed partially, which may negatively affect the stability of the reflective layer **130** and decrease the reflectance of the reflective layer **130**.

In addition, the method of increasing exposure intensity or growth exposure time to increase photo sensibility in the middle part of the reflective layer **130** may cause the other parts of the reflective layer **130** to be damaged and affect the structural stability and reflection effect of the reflective layer **130**.

The thickness of the reflective layer **130** is defined as 10  $\mu\text{m}$ , 30  $\mu\text{m}$ , 50  $\mu\text{m}$ , 70  $\mu\text{m}$ , and so on, to ensure that photo sensibility of the reflective layer **130** exposed on both sides

of the light-transmitting underlay substrate **110** is sufficient in a thickness direction, and the bonding of the photosensitive material in the reflective layer **130** is stronger. Accordingly, the structural stability of the reflective layer **130** is ensured, the reflectance of the reflective layer **130** is increased, and the overall display effect of the backlight plate **100** is improved. Preferably, as illustrated in FIG. **10**, a gap **132** is arranged between the side wall of the groove **131** on the reflective layer **130** and the pad **120** of the backlight plate **100**; that is, the reflective layer **130** and the pad **120** are arranged at intervals on the light-transmitting underlay substrate **110**, and the area corresponding to the pad **120** and the gap **132** is the first area **S1**. This structural arrangement enables the pad **120** to be fully exposed after exposure and development of the reflective layer **130** and prevents the actual size value of the groove **131** from being less than the designing size value due to the difference of exposure effect in the development process; thereby, the undeveloped reflective layer **130** remains on the surface of the pad **120**, which is bad for subsequent connection between the pad **120** and the light plate **140**.

Preferably, the gap **132** between the side wall of the groove **131** and the pad **120** is less than or equal to 30 micrometers ( $\mu\text{m}$ ). It is notified that the size of the gap **132** is directly related to the opening accuracy of the reflective layer **130**, and the larger the gap **132** is, the worse the opening accuracy of the reflective layer **130** becomes. If the gap **132** gets larger, the coverage area of the reflective layer **130** on the light-transmitting underlay substrate **110** becomes smaller, and the overall reflectance of the backlight plate **100** becomes smaller as well, thereby affecting the display effect of the backlight plate **100**.

In the actual production process, the gap **132** may be 2  $\mu\text{m}$ , 5  $\mu\text{m}$ , 10  $\mu\text{m}$ , 20  $\mu\text{m}$ , 30  $\mu\text{m}$ , etc. to prevent the reflective layer **130** from remaining on the pad **120** and to increase the overall reflectance of the backlight plate **100**. The value of the gap **132** can be correspondingly adjusted and designed according to the practical situations, which is not confined here.

Further, a backlight plate **100** is proposed by a preferred embodiment of the present disclosure. The backlight plate **100** is produced with a production method as mentioned above. Since all of the technical solutions of all of the above embodiments are employed in the backlight plate **100**, more than one of all of the preferred effects of the technical solutions of the embodiments are brought. No more detail is provided.

Please refer to FIG. **4**. The backlight plate **100** includes a light-transmitting underlay substrate **110**, a pad **120**, a reflective layer **130**, and a light plate **140**. The light-transmitting underlay substrate **110**, the pad **120**, the reflective layer **130**, and the light plate **140** are sequentially disposed. Especially, the light-transmitting underlay substrate **110** includes a first area **S1** and a second area **S2**. The pad **120** is disposed at a position corresponding to the first area **S1**, and the reflective layer **130** is disposed at a position corresponding to the second area **S2**. The light plate **140** is connected to the pad **120** to fix the light plate **140**. By regulating the division mode of the first area **S1** and the second area **S2**, the adjustment of the pad **120** is completed, and the adjustment of the arrangement of the light plate **140** is completed as well to meet luminescent requirements of the backlight plate **100**.

Preferably, a groove **131** is disposed on the reflective layer **130** corresponding to the pad **120**, and the groove **131** exposes the pad **120** to facilitate subsequent connection between the pad **120** and the light plate **140**. Especially, the

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plurality of pads 120 are disposed at intervals on the light-transmitting underlay substrate 110 to facilitate the connection between the plurality of pads 120 and the light plate 140 to regulate the arrangement of the light plate 140 to meet different display requirements of the backlight plate 100.

In a preferable embodiment of the present disclosure, a groove 131 is disposed on a reflective layer 130. The groove 131 exposes a plurality of pads 120. In other words, the reflective layer 130 is not disposed between the two of the adjacent pads 120. Such a structure is designed to facilitate the simultaneous connection between a light plate 140 and the plurality of pads 120 to regulate the luminescent mode of the light plate 140.

In another preferable embodiment of the present disclosure, a plurality of grooves 131 are disposed on a reflective layer 130, and the plurality of grooves 131 correspond to a plurality of pads 120 one on one. That is, the reflective layer 130 is filled between the two of the adjacent pads 120 to separate the plurality of pads 120 separately. Such a structure is designed to avoid the interference between light plates 140 connected to the different pads 120, thereby ensuring the luminescent effect of a backlight plate 100.

The reflective layer 130 at the opposite sides of the light-transmitting underlay substrate 110 is exposed in the production of the backlight plate 100 to ensure that photosensitivity of the reflective layer 130 on the second area S2 is compensated in a thickness direction, and the bonding of the photosensitive material in the reflective layer 130 is stronger. It is not easy to remove the reflective layer 130 corresponding to the second area S2 in the development process, so that undercut does not appear to the reflective layer 130 corresponding to the second area S2. The side wall of the groove 130 on the reflective layer 130 is vertical or close to the light-transmitting underlay substrate 110. In other words, the inclination of the side wall of the groove 131 on the reflective layer 130 relative to the surface of the light-transmitting underlay substrate 110 is smaller. So no gap exists between the side wall of the reflective layer 130 and the light-transmitting underlay substrate 110, thereby increasing the overall reflectance of the reflective layer 130.

Further, a backlight module 10 is proposed by a preferred embodiment of the present disclosure. The backlight module 10 includes a backlight plate 100. The backlight plate 100 is produced with a production method as mentioned above. Since all of the technical solutions of all of the above embodiments are employed in the backlight plate 100, more than one of all of the preferred effects of the technical solutions of the embodiments are brought. No more detail is provided.

Please refer to FIG. 11. A backlight module 10 includes a backing plate 200, a backlight plate 100, and an optical film group 300. The backlight plate 100 is disposed on the backing plate 200, and the optical diaphragm set 300 is laminated on the backlight plate 100. Especially, a plurality of backlight plates 100 can be disposed on the backing plate 200 with the method of splicing to prevent the area of a single backlight plate 100 from getting too large, which is good for reducing the difficulty of the production process.

A positioning groove may be arranged on the backing plate 200, and the backlight plate 100 and the optical film set 300 are disposed in the positioning groove. The positioning groove is good for defining the position of the backing plate 200 and the optical film set 300 and facilitating the assembly of the backlight module 10.

Above are embodiments of the present disclosure, which does not limit the scope of the present disclosure. Any

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modifications, equivalent replacements or improvements within the spirit and principles of the embodiment described above should be covered by the protected scope of the disclosure.

What is claimed is:

1. A production method of a backlight plate, comprising: providing a light-transmitting underlay substrate which comprises a first area and a second area, wherein the light transmission of the first area of the light-transmitting underlay substrate is less than that of the second area of the light-transmitting underlay substrate; forming a pad on the light-transmitting underlay substrate corresponding to the first area; coating a layer of photosensitive material on the light-transmitting underlay substrate and the pad to form a reflective layer; exposing a position of the second area at opposite sides of the light-transmitting underlay substrate that the reflective layer corresponds to; and developing the reflective layer to form a groove for exposing the pad on the first area that the reflective layer corresponds to.
2. The production method according to claim 1, wherein the exposing the position of the second area at the opposite sides of the light-transmitting underlay substrate that the reflective layer corresponds to comprises: exposing, with a first exposure intensity, a position of the reflective layer corresponding to the second area away from the light-transmitting underlay substrate; exposing, with a second exposure intensity greater than the first exposure intensity, an area of the light-transmitting underlay substrate that the reflective layer corresponds to the second area away from the reflective layer.
3. The production method according to claim 2, wherein the first exposure intensity is greater than or equal to 300 milli Joule (mJ); the first exposure intensity is less than or equal to 800 mJ; and/or the second exposure intensity is greater than or equal to 300 mJ; the second exposure intensity is less than or equal to 800 mJ.
4. The production method according to claim 1, wherein the exposing the position of the second area at the opposite sides of the light-transmitting underlay substrate that the reflective layer corresponds to comprises blocks of: exposing a position of the reflective layer corresponding to the second area away from the light-transmitting underlay substrate for a first predetermined duration; exposing an area of the light-transmitting underlay substrate that the reflective layer corresponds to the second area away from the reflective layer for a second predetermined duration; the second predetermined duration being greater than the first predetermined duration.
5. The production method according to claim 1, wherein the exposing a position of the second area at opposite sides of the light-transmitting underlay substrate that the reflective layer corresponds to comprises blocks of: exposing a position on the second area that the reflective layer corresponds to while the area on the second area that one side of the reflective layer away from the light-transmitting underlay substrate corresponds to and the area on the second area that the reflective layer away from one side of the light-transmitting underlay substrate corresponds to are exposed.
6. The production method according to claim 1, wherein the providing the light-transmitting underlay substrate comprises blocks of:

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- providing a light-transmitting substrate;
- disposing a light-shielding layer on a side of a light-shielding area of the light-transmitting substrate to form the light-transmitting underlay substrate; the light-shielding area being defined as a first area; or
- disposing the light-shielding layer at opposite sides of the light-shielding area of the light-transmitting substrate to form the light-transmitting underlay substrate; the light-shielding area being defined as the first area.
- 7. The production method according to claim 1, wherein the forming the pad on the light-transmitting underlay substrate corresponding to the first area comprises blocks of:
  - forming a metal layer on the light-transmitting underlay substrate;
  - etching a position of the second area that the metal layer corresponds to form the pad on a position of the first area that the light-transmitting underlay substrate corresponds to.
- 8. The production method according to claim 1, wherein the thickness of the reflective layer is less than or equal to 70 micrometers ( $\mu\text{m}$ ).
- 9. The production method according to claim 1, wherein a gap is arranged between a side wall of the groove on the reflective layer and the pad of the backlight plate; the gap is less than or equal to 30  $\mu\text{m}$ .
- 10. The production method according to claim 9, wherein the pad and an area that the gap corresponds to is the first area.
- 11. The production method according to claim 1, further comprising:
  - connecting a light plate to the pad.
- 12. A backlight plate, comprising:
  - a light-transmitting underlay substrate, comprising a first area and a second area;

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- a pad, disposed on a position of the first area that the light-transmitting underlay substrate corresponds to;
- a reflective plate, disposed on the light-transmitting underlay substrate; a groove being disposed on a position of the pad that the reflective layer corresponds to; the groove exposing the pad,
- wherein the light transmission of the first area of the light-transmitting underlay substrate is less than that of the second area of the light-transmitting underlay substrate.
- 13. The backlight plate according to claim 12, wherein the backlight plate comprises the plurality of pads; the plurality of pads are disposed at intervals; the groove exposes the plurality of pads.
- 14. The backlight plate according to claim 12, wherein the backlight plate comprises the plurality of pads; the plurality of grooves are disposed on the reflective layer; the plurality of grooves correspond to the plurality of pads one on one.
- 15. The backlight plate according to claim 12, wherein a side wall of the groove is vertical to the light-transmitting underlay substrate.
- 16. The backlight plate according to claim 12, wherein the light-transmitting underlay substrate comprises a light-transmitting substrate and a light-shielding layer; the light-transmitting substrate comprises a light-shielding area; the light-shielding layer is defined as the first area.
- 17. The backlight plate according to claim 16, wherein the light-shielding layer is disposed at opposite sides of the light-shielding area.
- 18. The backlight plate according to claim 12, wherein the backlight plate comprises a light plate; the light plate is connected to the pad.
- 19. A backlight module, comprising a backlight plate as claimed in claim 12.

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